

Outlet Quick Facts

Outlet Intake

- Located on Round Lake, 2.8 miles south of Minnewaukan, 0.6 miles east of Highway 281 (SW1/4, T153N, R67W, Sec 35)
- Eliminated need to cross Highway 281

Outlet Discharge

- Abandoned oxbow on Sheyenne River (SE1/4, T151N, R68W, Sec 8)
- Canal terminates into 1400 ft section of 6 ft Internal Diameter (ID) Reinforced Concrete Pipe (RCP)
- RCP flows into energy dissipation structure which discharges into oxbow
- Canal terminus structure has a hinged crest gate to control discharge
- Outlet flow can be stopped in less than fifteen minutes and contain all outlet water in the canal

Round Lake Pump Station

- Two 1250 HP 4160 V motors and two vertical turbine pumps (50 cfs each)
- One pump has return bypass to vary flow as conditions warrant
- 250 ft 54 inch high density polyethylene pipe connects pump manifold to intake structure in Round Lake
- Intake structure has pontoons connected by lines to shore to allow it to be filled with air or water to either submerge or float for seasonal installation/removal and includes 0.25 inch mesh to prevent uptake of adult fish species
- 30 inch ID Ductile Iron Pipe (DIP) connects each pump to stand pipe
- Stand Pipe (75 ft height, 40 ft diameter) serves as surge tank and allows pump efficiency to be maximized by pumping against constant head

Josephine Pump Station

- Two 1250 Horsepower 4160 V motors and two vertical turbine pumps (50 cfs each)
- One pump has return bypass to vary flow as conditions warrant
- Gabion intake structure in end of first canal section
- 30 inch ID DIP connects each pump to stand pipe
- Stand Pipe (90 ft height, 40 ft diameter) serves as surge tank and allows pump efficiency to be maximized by pumping against constant head

Canal

- Two sections totaling 10.3 miles (2.2 and 8.1 miles)
- 3:1 side slopes, 15 to 30 ft bottom width, 0.04% slope
- 10 road crossings (14 ft by 7 ft reinforced concrete box culverts with wingwalls)
- Multiple (as needed) cross drains to allow adjacent runoff patterns to be maintained

Pipeline

- 1.2 miles of 64 inch DIP, 1.8 miles of 54 inch DIP

Structures

- Two transitions structures (Pipeline to canal)
- Two drop structures (to lose elevation while maintaining low velocity in canal)
- Three inverted siphons to pass under wetlands, railroad. (each consists of three 6 ft ID RCP)
- Canal terminal structure transitions canal in to 6 ft ID RCP (contains hinged crest gate), and energy dissipation structure which discharges into abandoned oxbow on Sheyenne River

Operating Limitations

- Determined by North Dakota Pollutant Discharge Elimination System (NDPDES) Permit (Clean Water Act, Section 402)
- 100 cfs maximum discharge (50 cfs in first year of operation)
- 600 cfs combined discharge in Sheyenne River at insertion point (channel capacity limit to eliminate erosion and flooding concerns)
- 300 mg/L sulfate concentration in Sheyenne River downstream of insertion point (after mixing) to protect downstream beneficial uses since ~30-40% of the population of the state is downstream
- 1445 ft msl minimum operating level (governed by water quality trends, pumping site location, etc)
- Operate only during open water season (May 1st through November 30th)

Operation and Maintenance Costs

- Approximately \$1 Million per year at 100 cfs
- Power cost will vary as discharge varies with operating limitations

Permit Compliance Monitoring

- Biological Assessment performed on four reaches of the Sheyenne River prior to operation and after implementation as deemed necessary by Health Department
- Flow and water quality monitoring at outlet terminus, upstream and downstream of insertion point on Sheyenne River, three additional sites on Sheyenne River, and three sites on the Red River
- Monthly reports on outlet operation and water quality monitoring results to be submitted to Health Department and EPA
- An adaptive management plan will be developed prior to operation in order to ensure compliance with permit requirements and maintenance of beneficial uses of the water resources downstream.

Future Considerations

- Designed to be expanded if warranted in future (new NDPDES permit would be required)
- 64 inch DIP capable of ~275 cfs flow, 54 inch DIP capable of ~225 cfs
- Canal designed for 300 cfs capacity